

# 2N7008

## Small-Signal Field Effect Transistor

### N-Channel Enhancement Mode Silicon Gate TMOS

...are designed for high voltage, high speed applications such as switching regulators, converters, solenoid, and relay drivers.

- Silicon Gate for Fast Switching Speeds
- Relay Driver
- Telecommunication Switch
- Automatic Insertable
- Available in Ammo Pack
- Available on Radial Tape and Reel
- N-Channel, Small Signal, TMOS FET

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	60	Vdc
Drain-to-Gate Voltage ( $R_{GS} = 1\text{ m}\Omega$ )	$V_{DGR}$	60	Vdc
Gate-to-Source Voltage	$V_{GS}$	40	Vdc
Drain Current Continuous Pulsed	$I_D$ $I_{DM}$	150 1000	mAdc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	400 3.2	mW mW/ $^\circ\text{C}$
Operating and Storage temperature Range	$T_J, T_{stg}$	-5.5 to +150	$^\circ\text{C}$

#### THERMAL CHARACTERISTIC

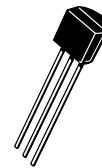
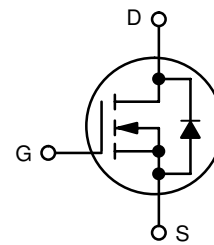
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	312.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/16 in from Case for 10 Seconds	$T_L$	300	$^\circ\text{C}$



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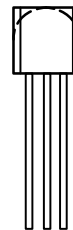
<http://onsemi.com>

**N-CHANNEL SMALL SIGNAL  
TMOS FET,  $R_{DS(ON)} = 7.5\ \Omega$ , 60 V**



TO-92 (TO-226)  
CASE 29

#### MARKING DIAGRAM



# 2N7008

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Drain-to-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 100 μA)	V <sub>(BR)DSS</sub>	60	–	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0) (V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	–	1.0 500	μAdc
Gate-to-Body Leakage Current, Forward (V <sub>GSF</sub> = 30 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	–	–100	nAdc

## ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 mA)	V <sub>GS(th)</sub>	–	–	Vdc
Static Drain-to-Source On-Resistance (V <sub>GS</sub> = 5 Vdc, I <sub>D</sub> = 50 mAdc) (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 500 mA, T <sub>C</sub> = 125°C)	R <sub>DS(ON)</sub>	–	7.5 13.5	Ω
Drain-to-Source On-Voltage (V <sub>GS</sub> = 5 V, I <sub>D</sub> = 50 mA) (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 500 mA)	V <sub>DS(ON)</sub>	–	1.5 3.75	Vdc
On-State Drain Current (V <sub>GS</sub> = 10 V, V <sub>DS</sub> ≥ 2 V <sub>DS(ON)</sub> )	I <sub>D(ON)</sub>	500	–	mA
Forward Transconductance (V <sub>DS</sub> ≥ 2 V <sub>DS(ON)</sub> , I <sub>D</sub> = 200 mA)	g <sub>FS</sub>	80	–	μmhos

## DYNAMIC CHARACTERISTICS

Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 f = 1 MHz	C <sub>ISS</sub>	–	50	pF
Output Capacitance		C <sub>OSS</sub>	–	25	
Reverse Transfer Capacitance		C <sub>RSS</sub>	–	5	

## SWITCHING CHARACTERISTICS (Note 1)

Turn-on Delay Time	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 200 mA R <sub>GEN</sub> = 25 Ω, R <sub>L</sub> = 150 Ω	t <sub>ON</sub>	–	20	ns
Turn-off Delay Time		t <sub>OFF</sub>	–	20	

1. Pulse Test Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

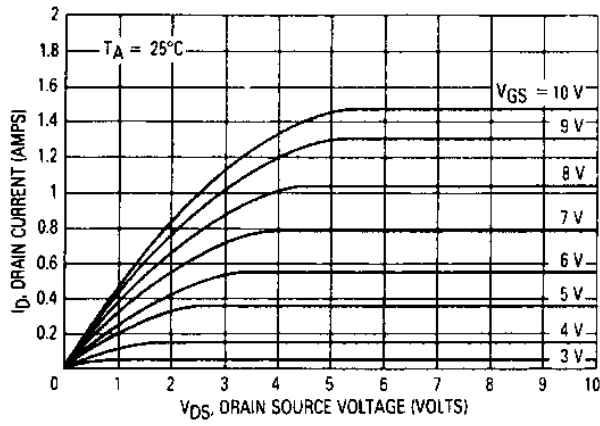


Figure 1. Ohmic Region

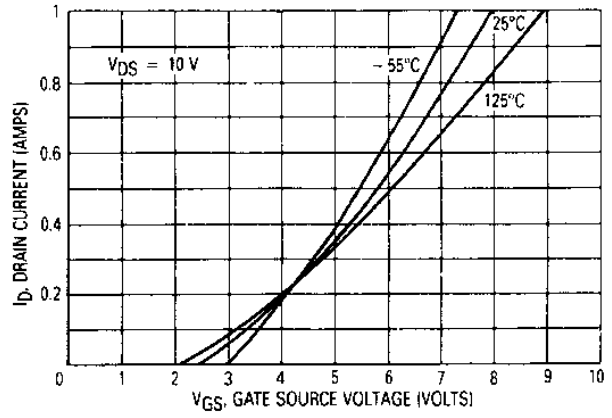


Figure 2. Transfer Characteristics

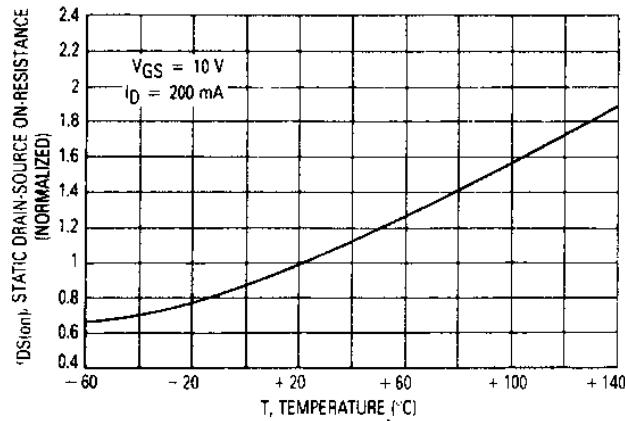


Figure 3. Temperature versus Static Drain-Source On-Resistance

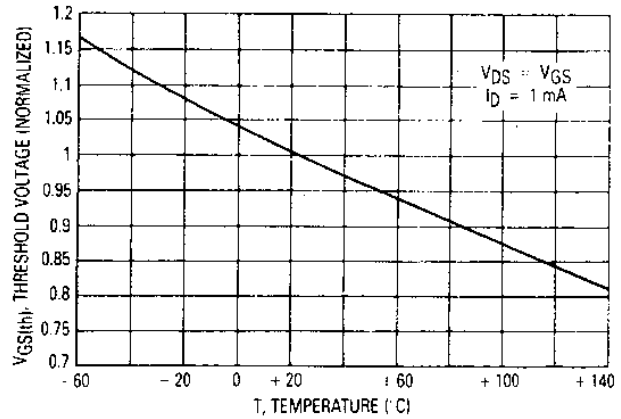
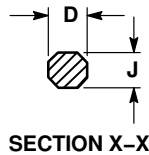
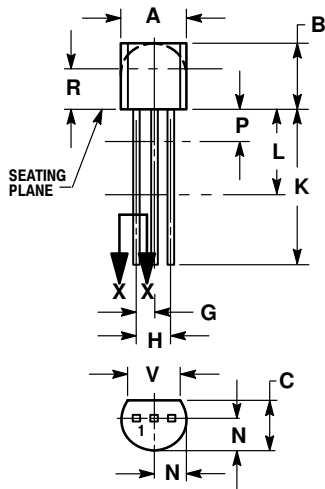


Figure 4. Temperature versus Gate Threshold Voltage

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## PACKAGE DIMENSIONS

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NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

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